Ghost Hill Infant School and Nursery

Maths Calculations Policy

Updated September 2023

The purpose of a Calculations Policy is to ensure that consistent strategies are being taught throughout the school, therefore developing the children's understanding of the subject as they move through the year groups. We believe it is important to have high aspirations for the children within our school and to deliver a broad and challenging curriculum.

Throughout their time at Ghost Hill, we would like all children to gain a deep understanding of maths using and applying their skills independently. We want the children to be able to use mathematical language accurately and make links in their learning.

In this policy you will find the core representations used within each year group for the four operations (+ - x and ÷) and see how they are used progressively across the year groups. Although + and - are shown separately, the link between them is made explicit during teaching. Likewise for multiplication and division.

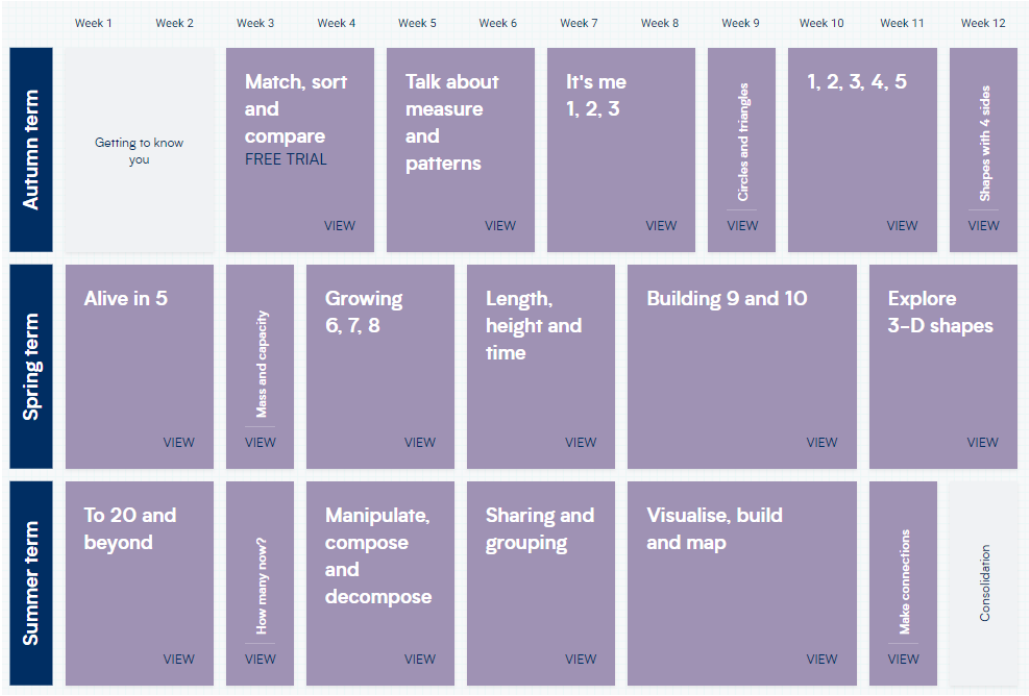
You will also find the key vocabulary used by the teaching staff to encourage and promote the correct mathematical vocabulary to support the children's learning and understanding.

Key Points of Mathematical teaching

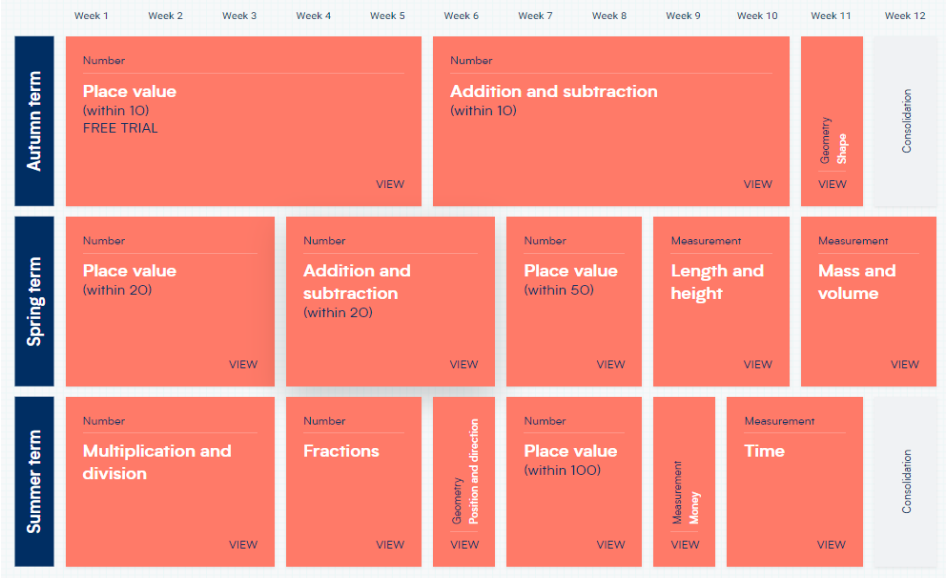
- Children will always be encouraged to have a go and take risks and to remember the positive mindset approach used throughout the school.
- Teachers will use and promote the use of Mathematical vocabulary throughout the Curriculum where appropriate.
- Where possible, mathematics will be used in other subjects to develop cross curricular links, provide opportunities for the children to apply their Maths skills outside of a Maths lesson, therefore giving meaning to their learning and understanding.

We deliver our Maths Curriculum by following the White Rose Maths teaching sequence. The areas of the Maths curriculum are broken down into weekly blocks for a suitable length of time to secure the pupil's mathematical understanding. If needed, teachers have the flexibility to extend the length of time on a particular mathematical area, should the pupil's need more time to consolidate their understanding. They will refer to the NCETM DfE Mathematics guidance June 2020 pg's 9-15 Ready to progress criteria to decide which units are most likely to be extended.
Year 1 and Year 2 follow this method of National Curriculum coverage whilst Reception and Nursery follow a more fluid approach to teaching and learning in mathematics, supplementing the Early Years Foundation Stage Curriculum with the White Rose teaching sequence. Below are the yearly overview tables, showing the different elements to the National Curriculum and how it is covered in the school using the White Rose approach.

Reception Yearly Overview



Year 1 Yearly Overview



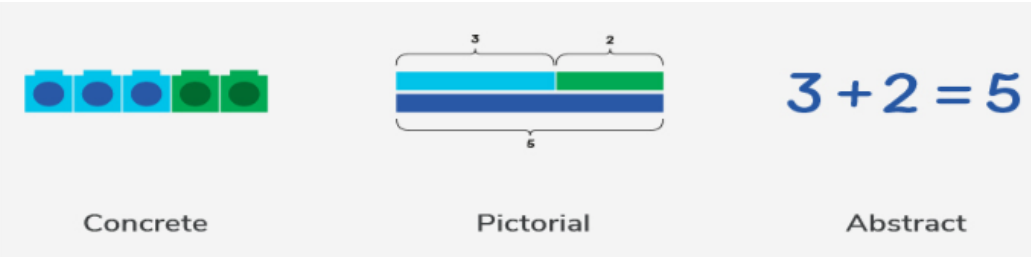
Year 2 Yearly Overview

Autumn	Number Place Value		Number Addition & Subtraction		Geometry Shape
Spring	Measurement Money	Number Multiplication & division	Number Fractions	Measurement Time	
Summer	Measurement Time (continued)	Number Length and height	Statistics	Geometry Position and direction	Measurement Mass, Capacity & Temperature

Concrete, Pictorial and Abstract (CPA)

There are many approaches used to help develop and solidify the pupils' understanding.

All our calculation work is taught using CPA. Here is an example of a concrete, pictorial, and abstract approach to addition.



- The concrete approach uses physical objects such as cubes to make the number sentence.
- The pictorial approach shows a drawn representation of the numbers.
- The abstract approach uses solely numbers and mathematical symbols, requiring the pupils to use their previous understanding of the concrete and pictorial methods to work out the answer.

In Nursery and Reception, pupils learn through concrete methods, with some pupils beginning to grasp pictorial and abstract approaches at the end of the reception year. Year 1 pupils use both concrete and pictorial methods, with some pupils beginning to grasp more abstract approaches. Year 2 pupils use primarily pictorial and abstract approaches, having grasped the concrete approaches in earlier school years.

The table below shows progression from Reception to Year 2 in the teaching of the four types of calculation. Each year group has progressive examples of methods used to solidify and extend understanding in relation to the National Curriculum requirements set by the government and the core representations used. It is clear to see how each year group builds on the methods used by the previous year group and develops pupil's understanding and knowledge as they progress through the school.

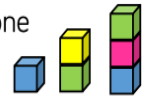
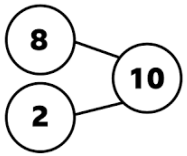
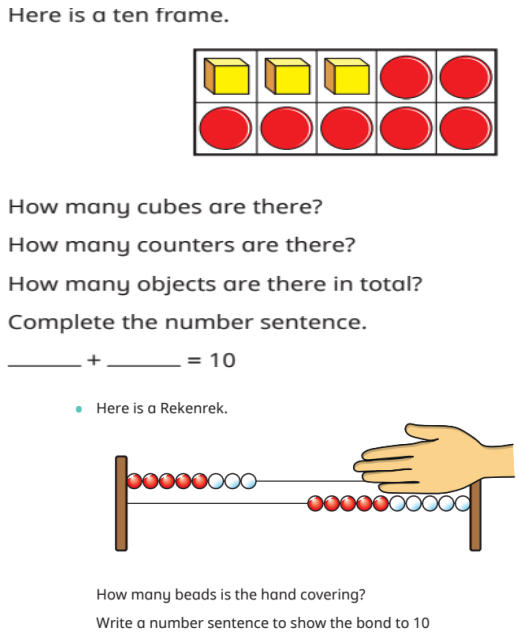
Progression and core representations across the year groups for the four main operations

Vocabulary to be used throughout all the year groups, reinforced, modelled and used by the children.

Cardinal – the number that indicates how many there are in a set.
Classification – The identification of an object by specific attributes, such as colour, texture, shape or size.
Conservation (number) - the recognition that the number stays the same if none have been added or taken away.
Numeral – the written symbol for a number e.g. 5, 7, 3, 9.
Ordinal - A number denoting the position in a sequence e.g. 1st, 2nd, 3rd.
Partition - Separate a set of objects into two or more subsets e.g. 2d shapes and 3d shapes. Or to partition a number – a way of splitting numbers into smaller parts to make them easier to work with. **Partitioning** links closely to place value: a child will be taught to recognise that the number 54 represents 5 tens and 4 ones, which shows how the number can be partitioned into 50 and 4.
Subitise – To instantly recognise a small quantity, without having to count how many there are.
Number – there are different contexts the phrase number can be used in:- To count a collection of objects e.g. five giraffes. A measure e.g. a length or weight of an object. A label e.g. a price tag 15p.
Quantity – The amount you have of something e.g. a cup of flour, three boxes, half an hour.

Addition

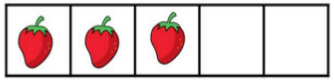
Reception	Year 1	Year 2
By the end of the year, children should be able to: • Understand the 'one more than/one less than' relationship between consecutive numbers. • Explore the composition of numbers to 10. • Automatically recall number bonds for numbers 0–5 and some to 10. • Automatically recall number bonds up to 5 and some number bonds to 10, including double facts.	**By the end of the year, children should be able to:** • Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. • Add with 1 digit and 2-digit numbers to 20, including 0. • Represent and use number bonds within 20. • Solve one-step problems that involve addition using concrete objects and pictorial representations. • Solve missing number problems such as 9 = ? + 5	**By the end of the year, children should be able to:** • Show how to partition 2-digit numbers. • Solve problems with addition: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods. • Recall and use addition facts to 20 fluently and derive and use related facts up to 100. • Add numbers using concrete objects, pictorial representations, and mentally, including: – a two-digit number and 1s – a two-digit number and 10s – 2 two-digit numbers

		– adding 3 one-digit numbers • Show that addition of 2 numbers can be done in any order (commutative). • Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
The children are first introduced to the concept of addition once they understand the terminology 'more.' They are being exposed to this mathematical language from day one with counting rhymes, role play, board games, finger rhymes and well-known stories. This concept is formally introduced with one more/one less at the same time. The children use a range of representations to show one more or one less whilst initially looking at amounts of 1,2 and 3. Then moving on to larger numbers. Use stories and number songs which count on and back to introduce the one more and one less patterns. Represent the patterns using bricks or cubes to support the understanding that each number is one more/less than the number before.  	The children will use a variety of methods to solve addition problems, being shown how to use a range of core representations to solve their workings. **Part Part whole method** The concept of partitioning numbers into two or more parts. Children will be introduced to this method to support them with number bonds as well as addition. It is important the children see the model in different orientations and with both objects as well as numbers. The diagrams below show this: -   Children will be able to then represent stem sentences, as well as writing them from the information in the part whole model, for example: - A part is 1. A part is 3. The whole is 4. 	**Recapping number bonds to 10** The children will initially recap their number bonds to 10 in different ways.  Building on the previous small step, children look at number bonds to and within 20. Links will be made to number bonds to 10, so that children recognise how knowing these bonds supports this learning.

Read The Gingerbread Man and as you read, represent the growing pattern of characters using counters or cubes. Can the children see the one more pattern building? Can they predict what will come next? What will happen when the gingerbread man is eaten?

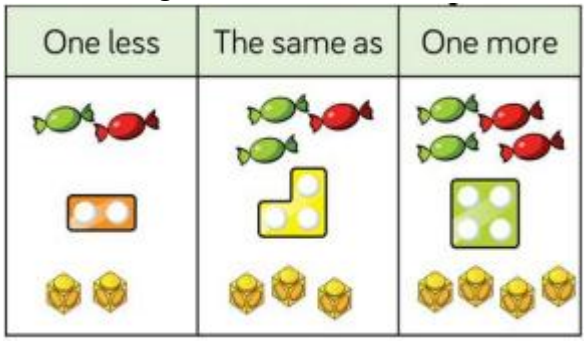
Children are initially introduced to the 5 frame. Using subitising to work out how many more/less to fill/empty the frame.

Ask children to make a number on a five frame.

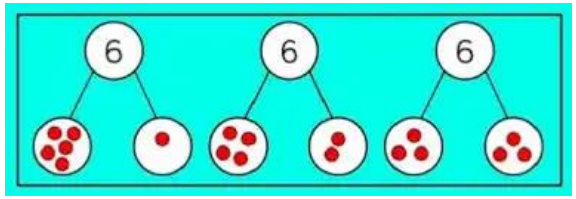


Can you show me one more? One less?
Use a 1-5 number track underneath the five frame.
Can you point to the number you made?
Can you point to one more and one less than your number?

The children are encouraged to use a range of representations, therefore becoming familiar with different resources which will used across all areas of Maths throughout their education.



6 is the whole, how many different part whole models can you draw to show this?



Draw a part-whole model to match the sentences.

2 is a part.
6 is a part.
The whole is 8

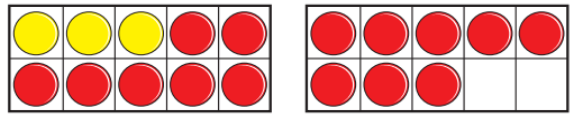
The introduction of the addition (+) symbol

Children learn that the + symbol means combining two or more parts and the = symbol shows the equivalence between the whole and the sum of the parts. Children initially start learning a number sentence
a + b = c before exploring them in a different order e.g. 10 = 7 + 3.

Numicon (Number shapes)

Children will begin to partition numbers into tens and ones so that they can add bigger numbers using

Here is a number shown on ten frames.



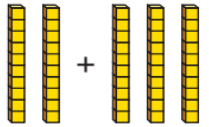
Complete the fact family to match the ten frames.

_____ + _____ = 18 18 – _____ = _____
_____ + _____ = 18 18 – _____ = _____

Can you write any of the facts another way?

Related facts

Children use the knowledge they have to identify new facts e.g. if they know 2 + 5 = 7 they should be able to use this knowledge to know 20 + 50 = 70.

- Complete the sentences to match the base 10
  - 
    _____ ones + _____ ones = _____ ones
    _____ + _____ = _____
  - 
    _____ tens + _____ tens = _____ tens
    _____ + _____ = _____

What is the same about the number sentences?
What is different?

This progresses into bonds to 100.

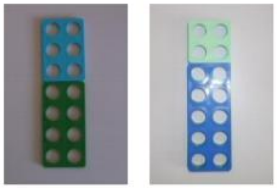
The children are then introduced to the concept of combing two groups together, using physical objects before then moving on to pictorial representations and abstract.

Number Shapes

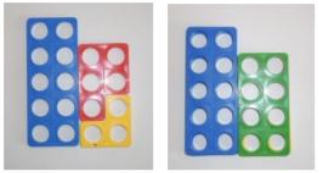
Provide an assortment of 1-5 number shapes. Ask the children to choose a number shape. Next, find a friend and combine their shapes to see what number they can make altogether? Repeat by moving to different friends.

'Tell your partner about the flowers. How many purple flowers can you see? How many blue flowers? How many flowers altogether?

Numicon.



8 + 6 = 14



13 + 5 = 18

It is important that children understand the concept of 'Equality' e.g. 8 = 8 and 8 = 7 + 1, as well as the more common arrangement 6 + 2 = 8.

Beadstrings and Rekenrek

For using with number bonds work or addition e.g., 5 + 3=

Push 6 beads on a Rekenrek.

Now push 2 more beads.

How many beads have you pushed now?

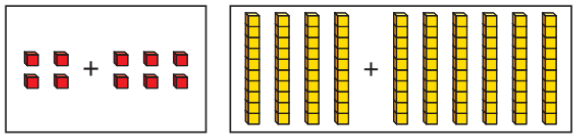
Complete the number sentence.

6 + _____ = _____

When progressing to addition with larger numbers, children will be shown how to add quickly with groups of ten.

Using a number track and number line

- Here are some number bonds.



How many ones are there?

How many tens are there?

Write the number sentence for each bond.

What do you notice?

Add and subtract 1s

In this small step, children add and subtract ones from a given number. Children should start to spot patterns when adding and subtracting 1s and link these to their knowledge of number bonds from earlier in the block. If children know, for example, that 3 + 1 = 4, then they can use this to understand that 23 + 1 = 24 and 53 + 1 = 54.

- There are 14 pencils in a pot.

  2 pencils are added to the pot.

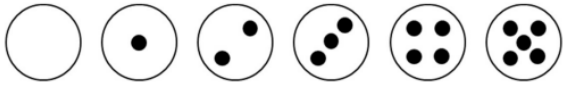
  How many pencils are there now?

Add by making 10

Children need to be able to partition a number into two parts in order to use number bonds to 10 to simplify a calculation.
They are shown how to do this using a variety of manipulatives.

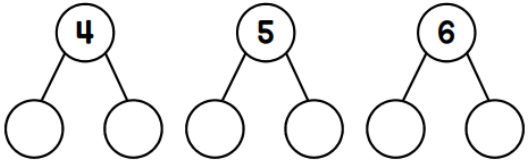
Dot Plates

Provide children with dot plates or cards from 0 to 5



Ask the children to arrange the 6 plates so that they have:

- a pair of plates with a total of 4 dots
- a pair of plates with a total of 5 dots
- a pair of plates with a total of 6 dots



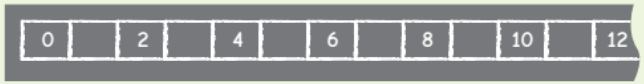
Is there more than one way to solve the problem?

Number bonds to 10

The children explore number bonds to 10 using real objects in different contexts.
Tens frames, Numicon, double sided counters, fingers and bead strings are all used to help find the different bonds.

10 frames or egg boxes (with 10 holes) can be partially filled with objects and the children asked How many more do we need to make a full ten?

Draw a number track from 0 to 20 in chalk on the playground. Only show the even numbers.



Ask children to stand on a number and then to write either 1 more or 1 less than their number in the adjacent box.

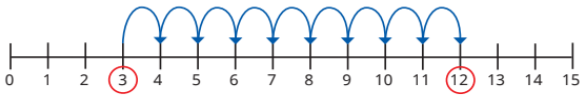
Dan starts at 9 and counts on 6

Show this on the number line and complete the number sentence.

9 + 6 = _____

Use the number lines to find the missing numbers.

▸ 3 + _____ = 12



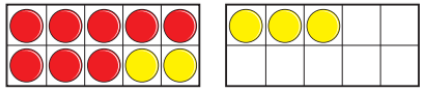
Tens frames

Adding two amounts within ten, by placing the different amounts on their tens frame to work out the total amount.

Children can visually see when a tens frame is half full or full and can therefore work out the answer quickly from visual representation.

Working out / representing number bonds to 10

- The counters show that 8 + 5 = 10 + 3



Use counters and ten frames to fill in the missing numbers.

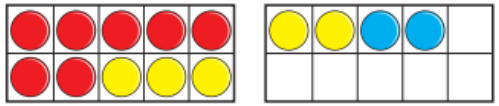
▸ 9 + 5 = 10 + _____
▸ 8 + 4 = 10 + _____
▸ 4 + 7 = 10 + _____
▸ 7 + 9 = 10 + _____

Adding three 1-digit numbers.

Children explore adding three 1-digit numbers with resources such as counters with tens frames and Rekenrek. Children are taught to add two digits together first and then add the third to the answer. They are encouraged to use their knowledge of commutative property to work more efficiently.

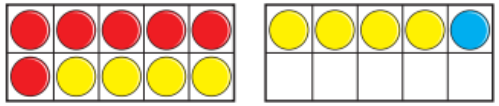
Use the ten frames to complete the additions.

▸



7 + 5 + 2 = _____

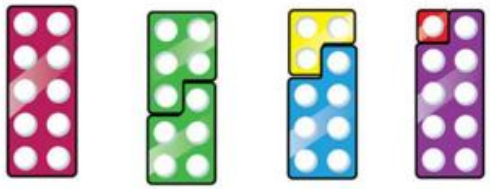
▸



6 + 8 + 1 = _____

Ron is working out 6 + 9 + 4

$$\underline{6} + 9 + \underline{4} = \underline{6 + 4} + 9$$
$$= 10 + 9$$
$$= 19$$



Pots to 10

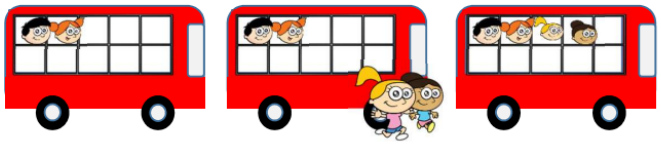
Provide pots labelled with numbers 1-10 and a selection of loose parts such as beads or cubes.
Ask the children to count the correct number of beads into each pot.
Can they find 2 pots which have 10 beads in total?
Is there more than one way to do it?
Can they find a way to make 10 by combining 3 pots? How can they check they have 10?
Is there more than one possible way?
Can they draw what they found?

Once children's counting on is secure, they are encouraged to subitise as much as possible and then count on from that amount.

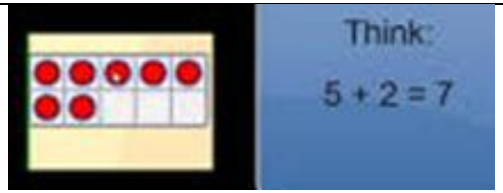
Prompts for Learning

Show me 5 fingers. Now show me 2 more.
How many fingers now? How do you know there are 7?
Did you count them all 1, 2, 3, 4, 5, 6, 7?
Is there another way to count them? We know we have 5 on this hand? Can we count on? 6, 7?

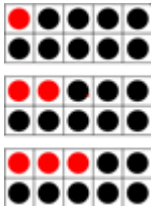
Use first, then, now to tell simple maths stories to practise adding more in real life contexts.

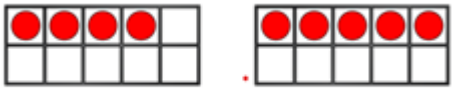


Doubling



Working out / representing number bonds to 10

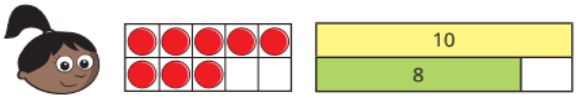




4 + ___ = 10 5 + ___ = 10

Bar Models

Children are introduced to bar models to support their understanding of number bonds to 10 and 20.



How many more counters does Sam need to fill the ten frame?

Complete the bar model.

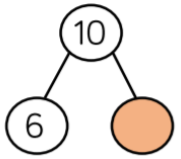
Write a number sentence to show the bond to 10

Part Part whole method

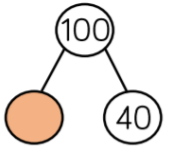
The concept of how numbers can be split into parts. Children using this **model** will see the relationship between the **whole** number and the component parts, this helps learners make the connections between addition and subtraction.

Move to using numbers within the part whole model.

They will then use the part part whole model to work out other corresponding number facts using variation.

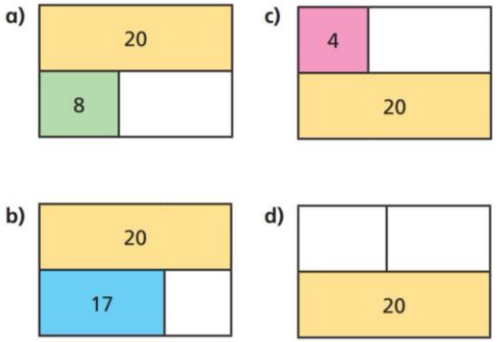


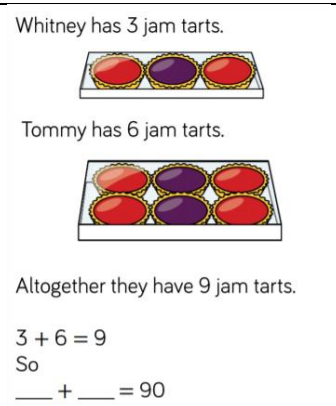
Therefore, they should be able to work out



Moving onto working out variation additions without the model.

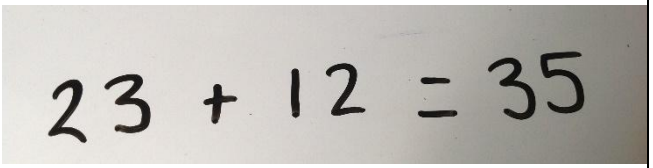
Children will learn that doubles means twice as many. Resources will be provided for children to build the amounts and notice patterns. 10's frames, Numicon and cubes are excellent manipulatives for children to see the doubles as they build them.





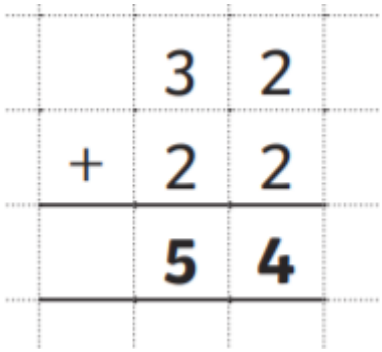
Base 10

Base 10 is used for partitioning numbers, using place value charts. Then progressing to adding the tens and the ones separately, moving on to addition of three-digit numbers.



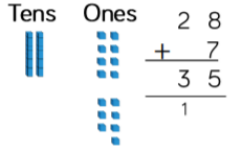
Column Addition

Adding the tens and ones separately.



Then moving onto exchanging ten ones for one ten.

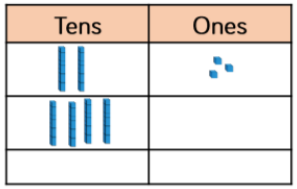
Find the total of 28 and 7



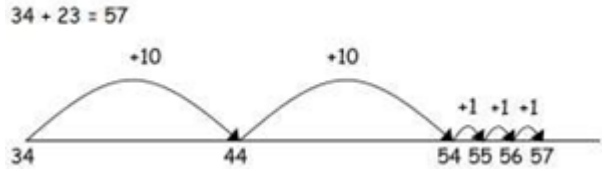
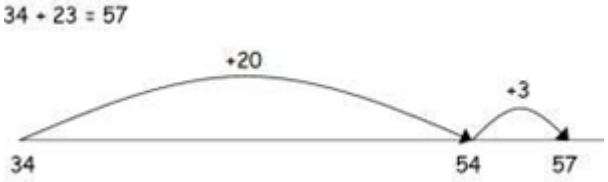
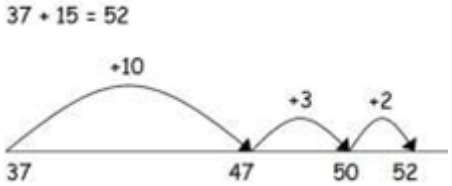
- Partition both the numbers.
- Add together the ones.
- Have we got 10 ones?
- Exchange 10 ones for 1 ten.
- How many ones do we have?
- How many tens do we have?

These can be supported by Place Value Charts:-

Use the place value charts and concrete materials to complete the calculations.



2 3
+ 4 0
_____

		<u>Number lines and 100 squares</u> Adding tens and ones.  Eventually building up to adding tens and ones as whole groups.  Then bridging through tens.  Children will be taught to recognise the patterns and rules in a 100 square to help them with additions to 100 and number bonds.

		Use a 100 square. If:  • 40 squares are shaded, how many are not shaded? • 45 squares are shaded, how many are not shaded? • 54 squares are shaded, how many are not shaded?
Vocabulary used in each year group (although not inclusive)		
Reception	Year 1	Year 2
Add, more, and, make, sum, altogether, double, subitising, one more, two more, ten more..... How many more to make....? How many more is.....?	Add, more, number bonds, altogether, increase, equals, plus, inverse, double, more, how many more to make.....? How many more is..... than.....? Counting on.	Add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more, ten more, one hundred more, how many more to make.....? How many more is ..... than.....? How much more is.....? Tens boundary.
Subtraction		
Reception • Have a deep understanding of number to 10, including the composition of each number; 14 • Subitise (recognise quantities without counting) up to 5; • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	**Year 1** By the end of the year, children should be able to: • Represent and use number bonds within 20 and related subtraction facts • Subtract one-digit and two-digit numbers to 20, including 0. • Solve one-step problems that involve subtraction, using concrete objects and pictorial representations. Solve missing number problems such as 7 = ? – 9 The children will be taught that subtraction is the inverse of addition and the link between them is made explicit throughout the teaching of both concepts.	**Year 2** By the end of the year, children should be able to: • Show how to partition 2 digit numbers. • Solve problems with subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods. • Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100. • Subtract numbers using concrete objects, pictorial representations, and mentally, including:

	The concept of subtraction is initially taught by children physically 'taking away' objects. They can then move on to crossing out on diagrams and pictures. In each question, children are required to find out how many are left.	- a two-digit number and 1s - a two-digit number and 10s - 2 two-digit numbers • Show that subtraction of 1 number from another cannot be done in any order. Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

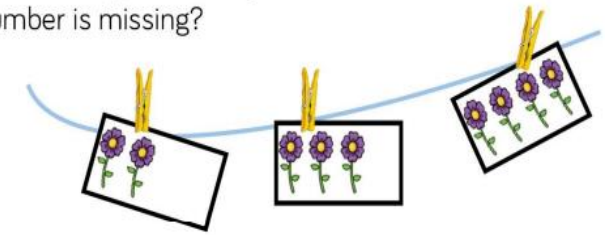
The children use physical props to initially understand the concept of 'fewer, less, taking away' before moving on to subtraction number sentences. The children are exposed to the language of 'less', 'fewer' and 'taking away' continuously in everyday conversations in the class, through counting songs and rhymes, in their play, stories etc.

As above, this concept is first introduced with one more and one less. Through singing well known nursery rhymes and songs e.g. five little speckled frogs, ten green bottles……the children are encouraged to notice the amounts getting smaller, one less each time.

Use the songs and stories suggested to role play one more and one less with the children e.g. Five currant buns.

How many buns are there altogether? Put the penny in the pot, how many pennies do we have? How many buns do we have now? Repeat the song and questions. Encourage the children to notice that there is one less bun each time, but one more penny.

Hide one of the cards and ask the children to work out which number is missing.
What strategies will they use to work out which number is missing?



Crossing out method

There are 7 birds in a tree.

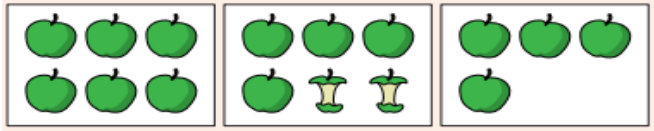
3 birds fly away.

Complete the sentences.

- First there were _____ birds in the tree.
- Then _____ of the birds flew away.
- Now there are _____ birds in the tree.

First, then, now stories

Ask them to tell a "first, then, now" story that matches the pictures.



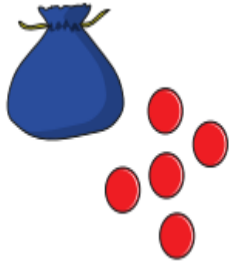
Part Part Whole model

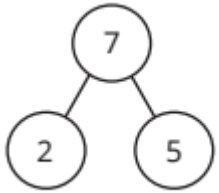
Children are formally introduced to the subtraction symbol (-) As with addition this is through partitioning.

There are 8 counters in total.

How many counters are in the bag?

Show this in a part-whole model and as a number sentence.



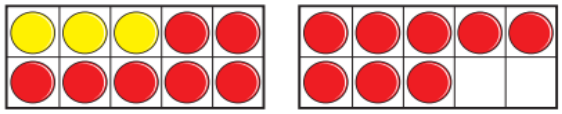


- 7 – 2 = _____
- 7 – 5 = _____

Fact families

After revisiting number bonds to 10 they are then introduced to number bonds to 20 where they are reintroduced to fact families writing the addition and subtraction number statements.

Here is a number shown on ten frames.



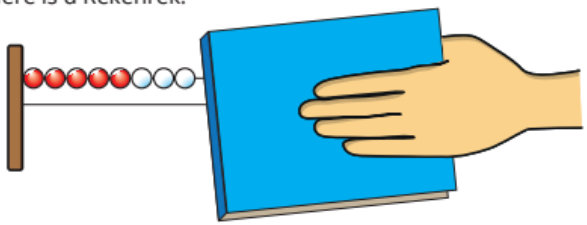
Complete the fact family to match the ten frames.

_____ + _____ = 18 18 – _____ = _____

_____ + _____ = 18 18 – _____ = _____

Can you write any of the facts another way?

Here is a Rekenrek.



How many beads are covered?

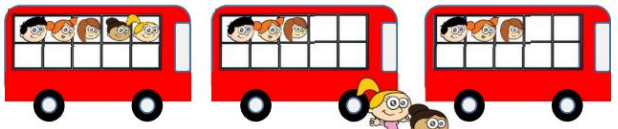
Write a number sentence to show the bond to 20

Write the fact family.

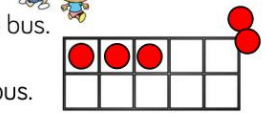
Add and subtract 1s

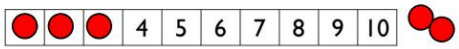
Children start to spot patterns and focus on the way in which the ones digit changes. Calculations crossing two are not included at this point.

As with addition, children are taught with practical resources, the first, then, now structure is again used to create mathematical stories where the children use 10 frames, number tracks and their fingers.



First there were 5 people on the bus.
Then 2 people got off the bus.
Now there are 3 people on the bus.



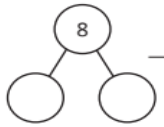


First there were 8 cakes.

Then 5 of the cakes were eaten.

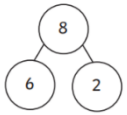
How many cakes are left?

Complete the part-whole model and the subtraction sentence.



_____ – _____ = _____

During the teaching of subtraction using a part part whole model the children are shown directly the relationship between addition and subtraction and introduced to fact families.



6	+	2	=	8
2	+	6	=	8
8	–	6	=	2
8	–	2	=	6

<u>Number line</u>

Children initially recap jumping back on a number line before completing more abstract problems.

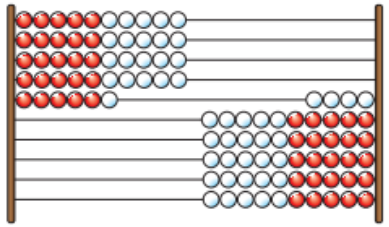
Complete the number lines and the subtractions.

9 – 3 = _____

There are 57 apples in a box.

- Mo takes 1 apple out of the box.
  How many apples are there now?
- Mo takes another apple.
  How many apples are there now?

The Rekenrek shows 46



Use the Rekenrek to complete the number sentences.

- 46 + 1 = _____
- 46 + 2 = _____
- 46 + 3 = _____
- 46 – 1 = _____
- 46 – 2 = _____
- 46 – 3 = _____

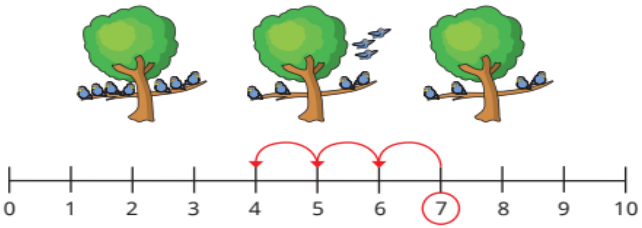
What do you notice?

Max is subtracting 1s.

22 = 29 – 7
22 = 28 – 6
22 = 27 – 5

What pattern can Max see?
Continue the pattern.

Mo uses a number line to work out how many birds are left.

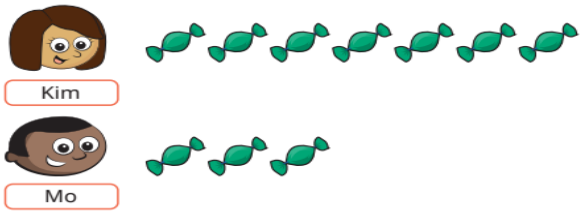


- Why is 7 circled?
- Why are there 3 jumps?
- What number do the jumps end on? What does this mean?

The children are then taught how to find the difference, exploring it as a form of subtraction. Finding comparisons between two amounts.

Children may wish to use either addition or subtraction when tackling these mathematical problems or they may wish to make both amounts and visually see how many more or how many less a number is.

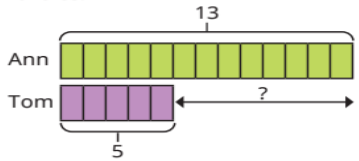
- Kim has 7 sweets and Mo has 3 sweets.



How many more sweets does Kim have than Mo?

How many fewer sweets does Mo have than Kim?

- Ann has 13 marbles.
  Tom has 5 marbles.

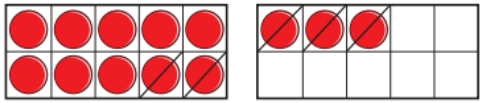


How many more marbles does Ann have than Tom?

Subtract across 10

In this step children subtract from 2-digit numbers less than 20 where they are required to cross 10.

The counters show that 13 – 5 = 10 – 2



Use counters and ten frames to work out the missing numbers.

- 14 – 5 = 10 – _____
- 18 – 9 = 10 – _____
- 13 – 7 = 10 – _____
- 12 – 8 = 10 – _____

Here is Tom's method for working out 11 – 5

Use Tom's method to work out the subtractions.

14 – 8	12 – 9	11 – 4	12 – 5

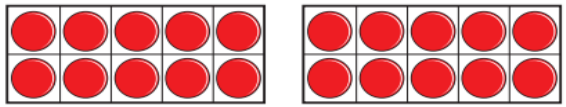
Subtract from a 10

In this small step, children subtract a 1-digit number from any multiple of 10 within 100. Their knowledge of fact families for number bonds is particularly helpful here. For example, if they are calculating 50 − 6, they can use the fact that 6 + 4 = 10, so 10 − 6 = 4, and so 50 − 6 = 44

Fill in the missing numbers.

- 10 – 4 = _____
- 10 – 7 = _____
- 10 – 2 = _____
- 10 – 1 = _____
- 10 – _____ = 5
- _____ = 10 – 3

The ten frames show 20



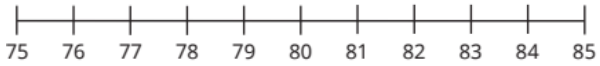
Use the ten frames to work out the subtractions.

20 – 4	20 – 7	20 – 2
20 – 1	20 – 5	20 – 3

Subtract a 1-digit number from a 2-digit number across 10.

The children use their secure foundation of Place Value to partition the numbers and use Base 10, Rekenrek and number lines to support.

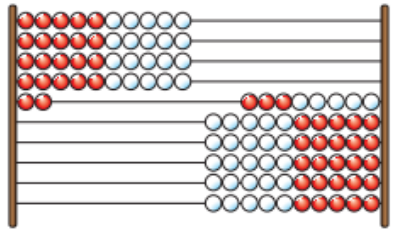
Here is a number line.



Use the number line to work out the subtractions.

83 – 1	83 – 3	83 – 5
83 – 2	83 – 4	83 – 6

The Rekenrek shows 42



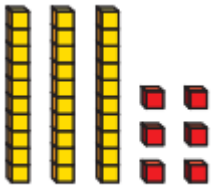
Use the Rekenrek to work out 42 – 6

Use a Rekenrek to work out 75 – 9

Subtracting 10s

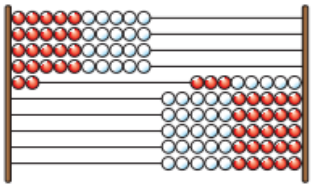
The base 10 shows 36

What is 20 less than 36?



The Rekenrek shows 42

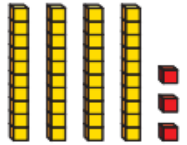
What is 42 – 30?



Subtract two 2-digit numbers (not across a 10)

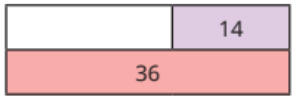
This does not require children to make an exchange but to use all of the previous smaller steps on subtraction.

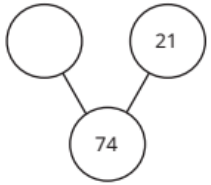
Ron uses base 10 to make a number.



- What is Ron's number?
- Ron takes away 2 ones.
  What number does he have now?
- Ron then takes away 3 tens.
  What number does he have now?
- What number has Ron taken away altogether?

Work out the missing parts.



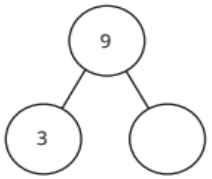


Missing number sentences/problems

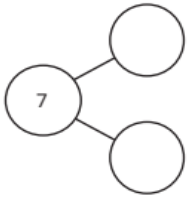
Children now use all of their subtraction knowledge built up over the small steps to find missing numbers in a calculation.

Complete the part-whole models and number sentences.

53 – 9 = 50 – _____



64 – 7 = 60 – _____



Work out the missing numbers.

- 22 – 7 = 20 – _____
- 22 – 7 = 23 – _____
- 22 – 7 = 19 – _____
- 22 – 7 = _____ – 6

Kim and Jo each have some money.

Kim has £40

She buys a coat.

Jo buys a dress.

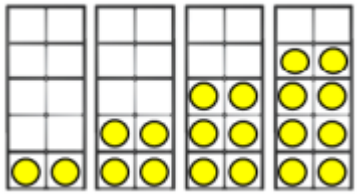
They both have the same amount of money left.

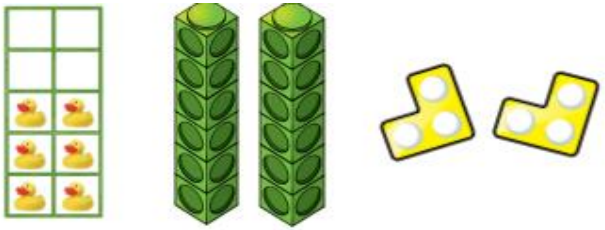
How much money did Jo have at the start?

How did you work this out?
Talk about it with a partner.

Vocabulary used in each year group (although not inclusive)		
Reception	**Year 1**	**Year 2**
Take away, leave, how many are left? One less, two less....ten less.....How many fewer is.....than.....? The difference between, is the same as	Subtract, take away, minus, leave, how many fewer is..... than....? How much less is.....? Half, halve, how many are left/left over? How many are gone? One less, two less, ten less.....how many fewer is...than....? Equals, is the same as, count back, difference between, how many more is …..... than.....?	Subtract, minus, leave, how many are left/left over?, how many less is… than…?, how much fewer is…?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on , count back, one less, ten less… one hundred less.
Multiplication		
Reception	**Year 1**	**Year 2**
By the end of the year the children should be able to: • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	**By the end of the year the children should be able to:** • To solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	**By the end of the year the children should be able to:** • Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
Doubling	**The children recap counting in 2's and 5's before moving onto 10s.**	**Once the children are able to recognise and make equal groups of objects, the next stage is**

Children will learn that doubles means twice as many. Resources will be provided for children to build the amounts and notice patterns. 10's frames, Numicon and cubes are excellent manipulatives for children to see the doubles as they build them.





How many gloves are there?

There are ___ gloves in total.
Represent the gloves using ten frames.

Continue colouring in 2s on the grid. What do you notice?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Complete the number lines by counting in 5s.

Use a 0-100 bead string to count in tens.
Can we count forwards and backwards in tens?

Can we count in tens on a number track as well?
How does this match counting on a bead string?

How many birds are there altogether?

There are _____ birds in each tree.
There are _____ trees.
There are _____ birds altogether.

Repeated addition

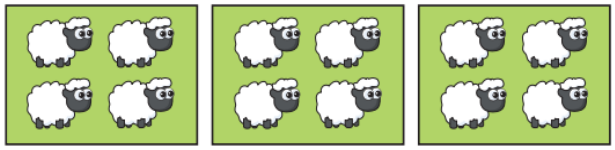
The children are initially introduced to the concept of multiplication through 'groups of.' They physically sort items into equal groups and learn to recognise when groups are not equal before adding the equal groups together.

Complete the sentences

There are ___ groups of ___ pencils.

There are ___ groups of ___ flowers.

to then add these groups together as a repeated addition. The children are then introduced to the multiplication symbol x.

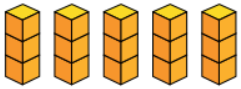


There are _____ equal groups with _____ in each group.

_____ + _____ + _____ = _____

The children are then introduced to the multiplication symbol alongside the repeated addition so they can see the correlation.

Complete the sentences to describe the equal groups.



_____ + _____ + _____ + _____ + _____ = 15

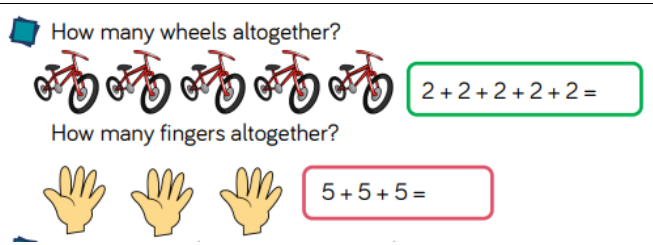
_____ × _____ = 15

This is then extended with abstract forms.

Complete the table.

Picture	Multiplication	Sentence
	4 × 10 = 40	4 lots of 10 is equal to 40
	35 = 7 × 5	
		6 lots of 3 is equal to 18

Arrays



Arrays

Children make arrays by making equal groups in columns or rows.

5 groups of 3
3 groups of 5

Understanding that multiplication can be solved with repeated addition e.g. 5 + 5 + 5.

Array	Description - columns	Description - rows	Totals
	5 columns 2 cookies in each column	2 rows 5 cookies in each row	2 + 2 + 2 + 2 + 2 = 10 5 + 5 = 10
	___ columns ___ donuts in each column	___ rows ___ donuts in each row	
	___ columns ___ fish in each column	___ rows ___ fish in each row	
	3 columns 5 cupcakes in each column	5 rows 3 cupcakes in each row	

Children then progress to doubling. Using different representations to work out the calculations to gain a deep understanding.

Using concrete as well as pictorial methods. Understanding it can be done in any order (commutative).

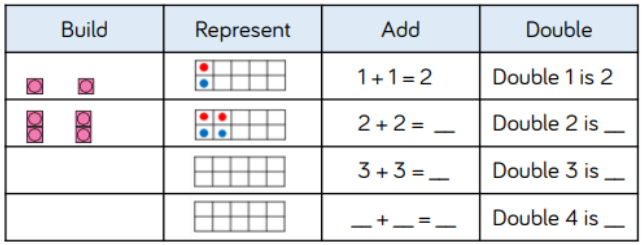
or

6 x 4

4 x 6

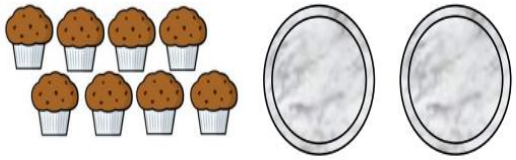
Multiplication facts

Mental methods to remember and solve multiplications- knowing they can draw times tables to find the answer.

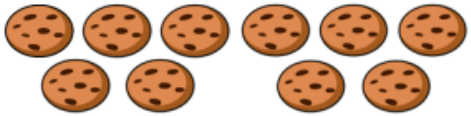
<table>
<tr><td></td><td>Complete and continue the table.
 
<table>
<tr><th>Build</th><th>Represent</th><th>Add</th><th>Double</th></tr>
<tr><td></td><td></td><td>1 + 1 = 2</td><td>Double 1 is 2</td></tr>
<tr><td></td><td></td><td>2 + 2 = __</td><td>Double 2 is __</td></tr>
<tr><td></td><td></td><td>3 + 3 = __</td><td>Double 3 is __</td></tr>
<tr><td></td><td></td><td>__ + __ = __</td><td>Double 4 is __</td></tr>
</table></td><td></td></tr>
<tr><td colspan="3"><u>Vocabulary used in each year group (although not inclusive)</u></td></tr>
<tr><td>Reception</td><td>Year 1</td><td>Year 2</td></tr>
<tr><td>Group, lots of, double</td><td>Odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? lots of, groups of, once, twice, five times, ten times, multiple of, times, multiply, multiply by, array, row, column, double</td><td>Odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double.</td></tr>
<tr><td colspan="3">Division</td></tr>
<tr><td>Reception</td><td>Year 1</td><td>Year 2</td></tr>
<tr><td>By the end of the year the children should be able to:
Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</td><td>By the end of the year the children should be able to:
Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
Recognise, find and name a half as one of two equal parts of an object, shape or quantity
Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.</td><td>By the end of the year the children should be able to:
Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
Calculate mathematical statements for division and write them using the division (÷) and equals (=) signs.
Show that division of 1 number by another cannot be done in any order.
Solve problems involving division, using materials, mental methods, and division facts, including problems in contexts.</td></tr>
<tr><td><u>Sharing</u>
Understanding that when sharing an amount each group must be fair by having the same amount, equal groups. Using both concrete resources and pictorial methods.</td><td>The children are taught division through the process of sharing equally into groups. They record their understanding through sentences, not through formal division in this year. Children are also given</td><td>After they have managed to consolidate equal groups, the children are introduced to the division symbol ÷ and division sentences.</td></tr>
</table>

the opportunity to see when a number of objects cannot be shared equally into equal groups.

Share the muffins equally between the two plates.
Complete the sentence.
___ cakes shared equally between 2 is ___



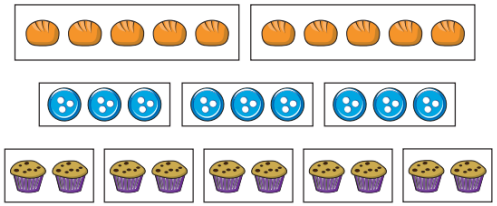
Dora has 10 biscuits.



She wants to share them equally at her party.

How many people could be at the party?

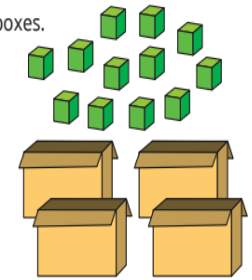
- Complete the sentences for each set of pictures.



There are _____ equal groups.
There are _____ in each group.
There are _____ groups of _____
There are _____ altogether.

- Share 12 cubes equally between 4 boxes.

Complete the sentences.
There are _____ cubes altogether.
There are _____ boxes.
There are _____ cubes in each box.
12 ÷ _____ = _____



Vocabulary used in each year group (although not inclusive)

Reception	Year 1	Year 2
Halve, half, share, share equally, groups	Halve, share, share equally, groups, equal groups of, divide, divided by, left, left over	Groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.